Civilian Research Project

History & Implementation of Item Unique Identification (IUID) – Has it Improved Asset Visibility?

by

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HISTORY & IMPLEMENTATION OF ITEM UNIQUE IDENTIFICATION (IUID) - HAS IT IMPROVED ASSET VISIBILITY?

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LIST OF ABBREVIATIONS

IUID……Item Unique Identification

DoD……Department of Defense

GAO……Government Accountability Office

OSD……Office of Secretary of Defense

GFP……Government Furnished Property

USD (AT&L)…… Under Secretary of Defense
Acquisition, Technology & Logistics

UID……Unique Identification

UII……..Unique Item Identifier

RFID……..…Radio Frequency Identification

SIM……Serialized Item Management

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HISTORY & IMPLEMENTATION ITEM UNIQUE IDENTIFICATION (IUID) – HAS IT IMPROVED ASSET VISIBILITY?

I. ARMY VISION and BACKGROUND

As early as 1999, organizations were concerned about asset visibility or the lack thereof. The Joint Total Asset Visibility Strategic Plan wrote[1]:

> "In every troop deployment this century, DoD has been plagued by a major difficulty—the inability to see assets as they flow into a theater and are in storage. This situation has led to direct and significant degradation in operational readiness. When assets in the pipeline are not visible, they are difficult to manage. Property is lost, customers submit duplicate requisitions, superfluous material chokes the transportation system, and the cycle continues. Assets at the retail level that are not visible and, therefore, not available for redistribution, further compound the degradation of operational readiness."

In response to the Government Accountability Office (GAO) Audit Findings critical of the Department's ability to physically and financially account for its spare and repair parts, and in support of the ongoing compliance requirements of the Chief Financial Officers' Act, Office of the Secretary of Defense (OSD) undertook to improve its ability to account for the Department's tangible items[2]. The DoD's first vision for unique item identification was to implement policy, regulations, and supporting processes that enable the Services to uniquely identify all significant tangible items in their inventories[3]. This initiative was considered a strategic business imperative for the Department of Defense[4].

On 29 July 2003, the Acting Under Secretary of Defense (Acquisition, Technology and Logistics) signed a policy memorandum entitled "Policy for Unique Identification (UID) of Tangible Items – New Equipment, Major Modifications, and Reprocurements of Equipment and Spares". This Policy made

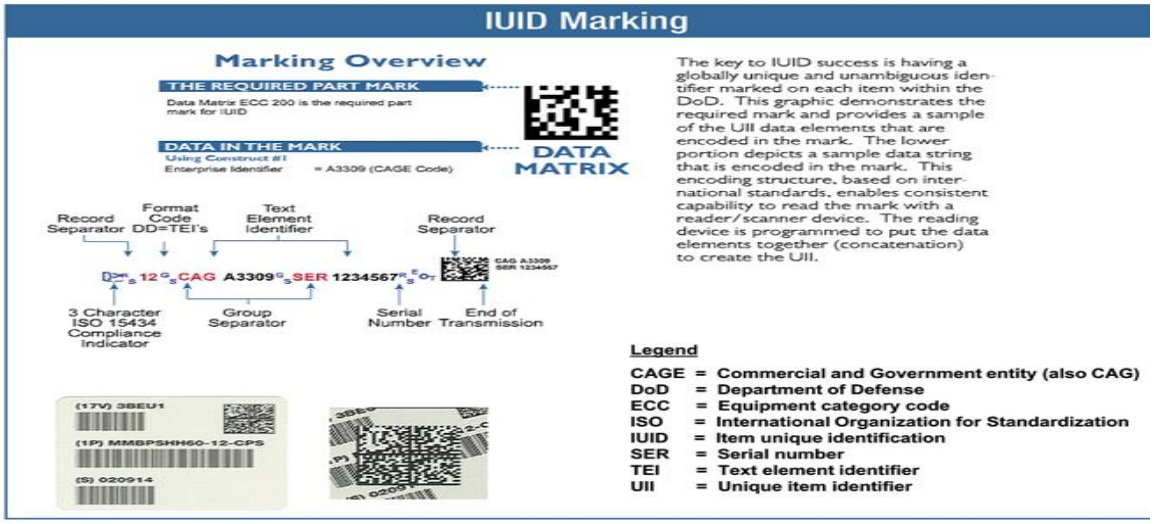
UID a mandatory DoD requirement on all new equipment and materiel delivered pursuant to solicitation issued on/or after January 1, 2004[5]. The Under Secretary of Defense, Acquisition, Technology & Logistics (USD, AT&L) issued verbal guidance that tangible assets manufactured by DoD's organic depots were to be considered "new" items which fall under UID marking policy, beginning 1 January, 2005. An item is considered "significant", and will be uniquely identified if: (1) the acquisition cost (manufacturing cost for DoD depots) is $5,000 or more, (2) it is either a serially managed, mission essential or controlled inventory piece of equipment, or a reparable item, or a consumable item or materiel where permanent identification is required, (3) it is a component of a delivered item, if the Program Manager has determined that unique identification is required, or (4) a UID or a DoD-recognized UID equivalent is available[6].

Policy updates begin in late 2004 (23 December, 2004) by USD (AT&L), with Memorandum entitled "Policy for Unique Identification (UID) of Tangible Personal Property Legacy Items in Inventory and Operational Use, Including Government Furnished Property (GFP)" that extended the parts marking and data management requirements, previously applied only to newly manufactured items, to all significant items currently in the DoD inventory.

II. Aspects/Definition of the IUID:

Several versions for IUID definitions are in circulation and I selected to highlight a few. According to the product manager, it is defined as a system of marking items delivered to the Department of Defense with unique item

identifiers, encoded in machine readable data matrix symbols, which distinguishes the item from all other like and unlike items[7]. Also, IUID describes optical codes that can be used for unique identification of items. Forty years ago, barcodes revolutionized labeling of goods and items, and today barcodes are a highly utilized technology in inventory management and supply chains[8]. These codes are classified as machine-readable identifiers and require external devices and a line of sight from the code to the device that collects data to interpret the content[9]. Some define it as a globally unique serial number and the graphic below demonstrates required mark and provides a sample of the UII data elements that are encoded on the mark[10].



A. UII and UID and its Relationship to IUID

UII is a set of data marked on the item that is globally unique, unambiguous, and robust enough to ensure data information quality throughout its lifetime and

support multi-faceted business applications[11]. It has been referred to as a super serial number.

Technically, IUID is the system or process by which items are marked and registered, while UII is the data contained in the marking. However, it is common to hear IUID used to refer to both the IUID process and the UII data set and unlike serial numbers that may be the same for identical items manufactured by different companies, no two military items will contain the same UII[12].
UID and IUID are basically used interchangeable. UID was once referred to as an Universal Identification, but it was determined insignificant when used by itself.

B. Unique 2D Matrix Code

In Tord Lien's 2011 Thesis titled, "Automatic Identification Technology: Tracking Weapons and Ammunition for the Norwegian Armed Forces", he reported that NASA wanted to find a way to individually mark items used in their Operations in 1997. They needed a marking solution that was compact, secure and that did not require to be on a label. His answer to their request was the development of the 2D matrix code[13]. This code reduces the space requirement, can be read from different directions, has a higher error tolerance and increases the volume of information gathered in the code to over two thousand characters[14].
The use of 2D matrix technology was adopted around 2004, in which all items of a certain value was required to be marked with machine readable IUID codes to improve inventory data quality, enable clean audits of a unit's inventory, enable speedy and accurate data capture, and improve visibility of their inventory[15].
Contractors that deliver goods to the DoD that fall within certain criteria are

required to mark items according to the DoD's regulations[16]. An optical 2D matrix code is printed or engraved symbols that represent textual information and consists of elements and cells that have similar size and need a specific search pattern preprogrammed in the reader[17] .

C. RFID Technology

RFID refers to technologies that utilize radio waves to automatically identify individual objects[18]. It allows information to be collected automatically without human contact or intervention[19]. An RFID "system" consists of an interrogator (reader) and a "tag" (transponder)- the reader generates an electromagnetic field; upon entering the electromagnetic field, the "tag" becomes active, turning on its own transmitter, allowing it to respond to the interrogation from the reader[20]. The reader accepts the data from the "tag" and transmits the information to a computer for further processing and is seen as an enabling technology that will effectively address the long standing problem of successfully tracking material at crucial nodes of the distribution pipeline[21].

The DoD's specific vision for RFID is seen as an important piece in linking all legs of the Supply Chain; in short, linking the supply chain end to end[22]. RFID is being viewed as an opportunity to track assets in a variety of functional circumstances: locating assets stored in a warehouse, conducting inventories, or tracking material flowing through a maintenance operation[23]. One of the most important contributions could be for tracking material from its point of origin though the entire supply chain to the last tactical mile the report states.

A comparison is that the Bar-Code “sees” the material, while an RFID Tag “hears” the material. Whereas a bar code must be physically seen by a scanner in order to be read, it is not so with an RFID “tag”- RFID permits material to pass by a given point at a fairly high rate of speed and “read” a label reliably at distances as far away as 25 feet[24].

D. Relationship between IUID and RFID

Below, the article from ACQuipedia explains the relationship in detail: “Each RFID tag is identified with a unique serial number, and it is one of a kind, very much like its sister technology, IUID (Item Unique Identification). Comparing various sources, there seems to be a little confusion about the relationship between IUID and RFID. They share a common bond in that they both generate one of a kind serial numbers, but beyond that they are quite different. An IUID mark identifies individual items that warrant a unique identifier, whereas an RFID tag identifies individual packages in transit. One could say that IUID “identifies the world” while RFID “links the world.” Another point of distinction is that IUID is a business oriented concept whereas RFID is a logistics oriented concept. In short, IUID is, in part, dollar driven; RFID is not. In general, an item will not be marked with an IUID stamp unless it meets a minimum threshold of $5,000 in value, although there are exceptions to this general rule. Not so with using an RFID tag. All DoD materiel that is destined for the military supply pipeline, regardless of dollar value, can be tagged with an RFID chip. Probably where the two technologies differ the most is the manner in which their respective “marks”

are read. An IUID mark is read similarly to a standard bar code, that is, up close and personal. In contrast, an RFID tag can be read at a distance"[25].

III. Progress of Implementation in the Services

The policies have been in existence for IUID since 2003, and the Army as well as the other Services previously reported some difficulties. Some challenges noted were marking legacy items and defining the requirements and business processes to use IUID in automated information systems for product life cycle management and financial management. While we won't focus on those challenges in this paper, the different Services are addressing them appropriately. We know that sometimes change is hard and it takes awhile for the entities get motivated to begin the transition. However, in 2006, the Services really started to begin implementing the original policy and its updates, and the progress has been substantial; there are currently more than 1 million items registered in the DoD's IUID Registry, and the rate of entries continues to increase[26]. Over 240,000 legacy items were registered through the first quarter of FY07[27].

During the last quarter of 2006, the number of accepted Navy UID program implementation plans increased by more than 150 percent[28]. Leadership committed the Navy to completing all its 251 UID program implementation plans by the end of the second quarter FY07. Dr. Delores Etter, Former Assistant Secretary of the Navy for research, development and acquisition, saw value in the use of IUID and she played a significant role in the Navy being out front implementing the plan[29]. She stated that, "We are in an environment that demand cost-wise readiness. This isn't about compliance; rather it's about finding better

business methods for providing that readiness. IUID can do that by improving the ability to track our assets." Service Progress in Registering Legacy Items: Over 240,000 legacy items were registered through the first quarter of FY07. Under Etter's leadership, the Department of the Navy, with over 130,000 UIIs registered, has taken the lead to identify opportunities to implement IUID. The Navy also used IUID for more efficient and effective missile tracking. Under sponsorship from the DoD UID Policy Office, the Navy International Programs Office (NIPO) executed an IUID project ("IUID Missile Tracking"—IMT) to leverage IUID asset information and generate shipping documentation, while allowing asset verification for missiles and other assets being sold, shipped and inventoried under the DSCA Golden Sentry Program[30].

The IMT project demonstrated the ability to capture missile IUID data, seal the missile in its container, create appropriate shipping documents, and observe the IUID based transactions as the missile was shipped, received, and inventoried.[31] The missile Unique Item Identifier (UII) would be related to its container UII and then related to a serialized container seal. The results were impressive: New processes reduced inventory time by 95 percent, inventory cost by 97 percent, and labor expense by 67 percent; inventory visibility increased to 100 percent annually; data accuracy improved to 100 percent[32]. In addition, the use of seals greatly improved security during transportation; and provided visibility at title transfer, shipping, and freight forwarding[33].

However, according to A2B Tracking Solutions, Inc., the Air Force and Marine Corps has made tremendous efforts in integrating the plan, and both services

are leading the charge since 2009. The Air Force leads in percentage of expected plans that have been accepted, and the Army continues to have the largest number of total IUID (legacy-plus-new) records. The overall DoD UID program plan effort is 45 percent complete, with 363 UID implementation plans as of November 2006[34].

Dianna Woody reported that the Army started to have success in implementation in 2006. Candidate lists of items to be marked with IUID were refined, and the marking process began on major programs[35]. The Abrams tank is a successful pilot program, and over 1,300 parts were identified for meeting the criteria for IUID marking[36]. This marking is currently being accomplished through a phased implementation. All criteria for initial operating capability (IOC) have been met with the exception of manual intervention with the IUID registry[37].

The IUID Scorecard Steering Group meets frequently and their objective is to provide governance and oversight for DoD IUID implementation. Below are scorecards from the Army (figure 1), Air Force (figure 2) and the Marines (figure 3) as of November 2011 on their progress in implementing IUID[38]:

IUID Scorecard (Army) – 4 November 2011

Objectives

- Policy Updates
- Systems Updates (AIS and ERP)
- Contract Compliance Rate
- Physical Marking
- Use of IUID Registry

Engage Key Stakeholders

Timeline

- *Legacy items requiring marking ~ 12M (estimate does not include controlled items)*
- *Identify, Synchronize & Finalize Requirements:*
  - *Develop Plan for Marking items Synchronized with GCSS-A and LMP Deployments – Sep 2011*
  - *AIT:*
    - *Basis of Issue Plan – May 2012*
    - *Procure scanners – Oct 2012*
  - *Training - Jul 2012*
  - *Mobile Marking Teams:*
    - *Request funding – Feb 2012*
    - *Begin marking – Aug 2012*
  - *Update Army Regulations (AR) – Oct 2013*
- *Systemic updates with IUID*
  - *GCSS-A:*
    - *Process mapping & gap analysis – Aug 2013*
    - *Fielding – 4Q FY12 through 4Q FY17*
  - *LMP:*
    - *Identify technical requirements – Jan 2013*
    - *Implement SAP Enhancement Pack – Nov 2013*
    - *Design & build LMP IUID solution – Aug 2014*
    - *Integrate & test with Trading Partners, Army IUID Warehouse & DoD IUID Registry beginning Apr 2014 through to full implementation – Sep 2015*

Key Accomplishments/Events

- *Policy Update:*
  - *AR 70-1 "Acquisition Policy" released*
  - *AR 700-XX IUID Policy (Worldwide Staffing comments under review)*
  - *IUID Secondary Item (in use/inventory) Policy Refinement memo released*
  - *Technical Documentation memo for Labeled Legacy Items released*
  - *Legacy Mark Progress Reporting memo released*
  - *HQDA G-4, IUID Process Integration Team memo released*
- *94% of contracts compliant (based on random survey)*
- *Senior Executive Service Steering Group Established*
  - *Quarterly meetings*
  - *ASA(ALT), G-8, G-4, CASCOM and HQAMC participation*
  - *Assess implementation progress (focus on developing use processes)*
  - *Last meeting conducted 9 August 11*
- *HQDA, G-4 IUID Process Integration Team*
  - *Facilitate alignment & synchronization with implementation*
  - *Coordinate policy, integration & processes with USAMC, subordinate commands, and USAMC marking activities*

Issues & Concerns

- *Accuracy of Service Legacy Numbers In DoD IUID Registry (e.g., marked vice registered, using Service codes, etc.)*
- *Developing "Use" processes & capabilities across the Enterprise*
  - *Map processes and identify gaps and cost drivers*
  - *Identify policy & process impacts*
  - *Operate in a "Mixed" IUID Environment (i.e., some items not marked)*
  - *Mitigation through SES Steering Group (marking, AIT & AIS integration)*

G

On schedule and no significant issues | Behind schedule but will meet ECD | Behind schedule and won't meet ECD

5

Figure 1: chart indicates the Army is on schedule with no significant issues

IUID Scorecard (USAF) – Nov 2011

Objectives

- Policy Updates
- Systems Updates (AIS and ERP)
- Contract Compliance Rate
- Physical Marking
- Use of IUID Registry

Timeline

- *Systemic updates*
  - *ECSS (design to go-live) – FY 2012*
  - *Enterprise UII Read Application (FY 2012)*
- *Over 2M Items Marked as of Jul 11 (Acquisition and Legacy)*
- *Legacy Data*
  - *Class IX: 7M (~40K marked/~10K registered)*
  - *Class VII: 5.3M (~1.1M marked/ ~700K registered)*
  - *Class II: 1M (gas masks, ESAPI) In Work*
- *Acquisition and Legacy – Class IX/VII/II*
  - *Drive increased use of DFARS: On-going*
  - *Class IX marking in depots -- FOC: Dec 15*
  - *Class VII – AFEMS Project: Jun 12*
  - *Class II – Developing project -- Pilot: Sep 11*

Key Accomplishments/Events

- *Contract Compliance Rate*
  - *Briefed Contracting Sr leadership/MAJCOM Policy Chiefs on requirement at Policy Conference 7 Apr 11*
  - *DFARS 252.211-7003 (IUID clause)*
    - *3QFY11 -- 90% of contracts that met IUID criteria included this clause (up from 86% in 4QFY10)*
  - *DFARS 252.211-7007 (GFP)*
    - *3QFY11 -- 94% of contracts where GFP is provided included this clause (up from 60% in 4QFY10)*
- *Revised AFMAN 23-110 to include IUID marking*
- *Asset Marking & Tracking WG -- Apr 11*
- *Legacy Part-marking WG -- Mar/Jun 11 – Class IX*
- *AFEMS Marking WG -- Mar/Jun 11*

Issues & Concerns

- *Engineering Analysis Lagging*
  - *Class IX assets requires ECOs; 3K of 18K completed*
- *Functional Involvement to achieve SIM*
  - *Change management*
  - *IUID integration into business process*
  - *Funding for marking and eTools*
- *Governance Structure needed to drive change*
- *Status of ERP ... Legacy AIS requires modification*
- *Data Validation and Management*

G

On schedule and no significant issues | Behind schedule but will meet ECD | Behind schedule and won't meet ECD

7

Figure 2: chart indicates the Air Force is on track with no significant issues

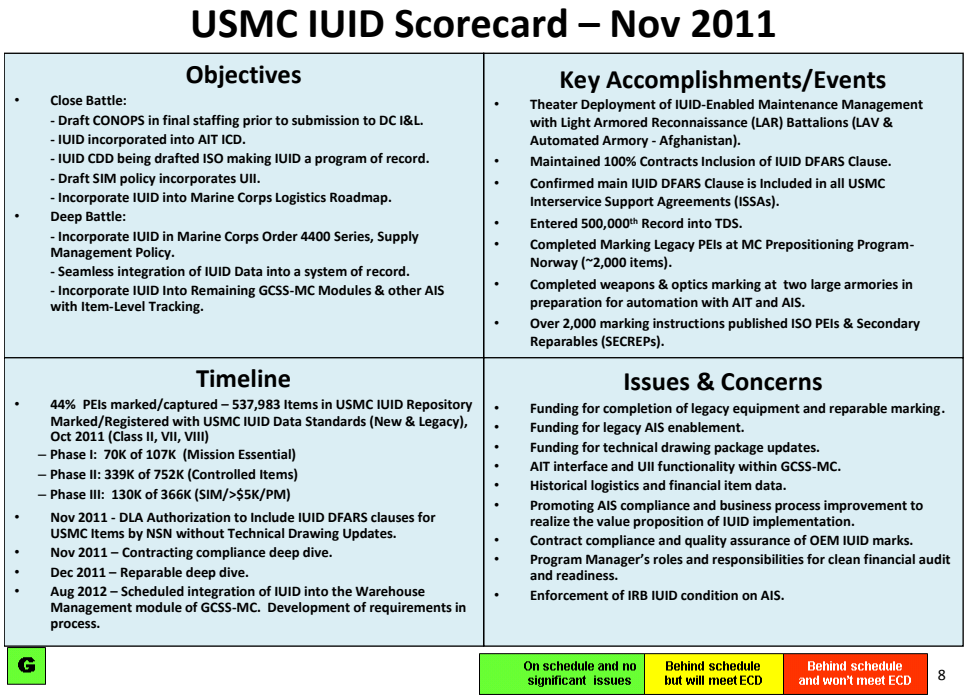


Figure 3: chart indicates that the Marines are on schedule with no significant issues

The Navy's data is from January 2011. It does not provide an overall status indicating whether they are on track and have no significant issues, but it does identify information on challenges & opportunities and issues and concerns. See the chart below[39]**:**

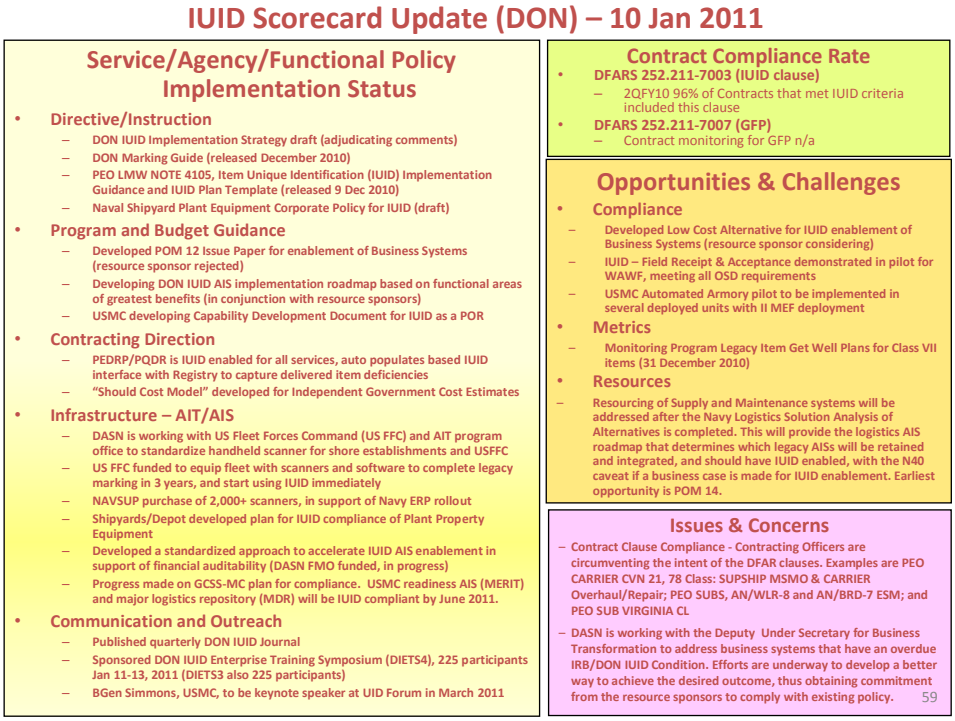


Figure 4: chart displays the Navy's status as of January 2011

IV. Industry Buy In

For years, such companies as Hewlett-Packard and Wal-Mart have incorporated item identification systems into their products with great success, improving customer relations and reducing costs associated with life cycle asset management. Wal-Mart recently extended the concept of asset management, integrating Radio Frequency Identification into supplier packaging requirements to enhance efficiency in stocking and inventory control[40]. The Department of Defense is taking successful item identification tactics a step further with IUID by using 2-D marking and automatic data capture to establish permanent, globally unique identification to identify, tracks, and manage individual DoD assets throughout their life cycle[41]. Leah Aspell elaborated in his article on how Dell accelerated its IUID implementation. He wrote, "When Bob Smolinski accepted

his position as the Office of the Secretary of Defense (OSD) IT Asset Management Branch Chief in December of 2005, he took on a difficult challenge of how to consolidate 14 different inventory tracking systems into one system that met all the department's needs. Despite semi-annual audits by Washington Headquarters Services, the process lacked an uniform system to track the 38,000 reportable IT assets within and across components. As soon as Smolinski understood the system requirements and challenges ahead, he immediately thought of IUID, a system for distinguishing a single item from its identical counterparts through the use of an identifying mark or label, and contacted the UID Policy Office. Once IUID was determined to be the appropriate solution, the team immediately began to develop an IUID implementation plan"[42].

Because they were designing a new system, the OSD team had unusual flexibility to choose the methods and technology that would best suit the application without having to consider multiple restraints[43]. "We had to establish everything, from getting a warehouse, trucks, and equipment, to the procedures for getting IT assets into and out of the Pentagon," says Smolinski. As Dell began processing the IUID requirement and shipping finished orders to the DoD maintenance facilities, John Medici, a member of Smolinski's team, determined very quickly that the 2D Data Matrix was not IUID-compliant. To correct the situation, Solms immediately assigned a Dell six-person team to solve the problem and re-label the erroneous markings[44]. Within 72 hours of realizing the 2D data matrix was wrong, Dell changed the process to better meet the OSD 2D. Because of the dedication of Dell and other suppliers, OSD received many

properly marked items in 2006. OSD ordered approximately 3,200 new PCs, 1,000 printers, 1,300 laptops, 1,200 monitors, and 300 scanners that was all delivered to the IT warehouse with the correct IUID mark[45].

Peter Collins' blog tracks more industry responses and reports that industry suppliers have responded favorably to DoD's IUID requests. There continue to be presentations at forums by National Defense Industry Association and Aerospace Industries Association (AIA) member companies like Lockheed Martin, Pratt & Whitney, Honeywell, Rolls-Royce, Sikorsky, and Boeing, explaining how they have gained value from IUID[46]. These companies present information describing how automatic identification technology reduces costs through improved data quality and enhanced quality control during product planning, development, life cycle, and inventory control.[47] The AIA has developed a common supplier flow-down requirement to further expand IUID use as the single identification across industry and DoD for supply-chain management. Many defense industry suppliers identify IUID as the single best practice for item management across the corporate spectrum for both commercial and government business[48].

The impact of the IUID initiative has been positive among the small-business community as well, in part, because of the array of low-cost products and service providers[49]. Training materials have been readily available, and the Procurement Technical Assistance Centers have added IUID training to their outreach efforts to small businesses[50]. This support and the straightforward IUID requirements have resulted in small business accounting for more than half of the total

businesses that have delivered compliant items to the IUID Registry. IUID has also increased business opportunities for many small businesses by generating a demand for equipment and services to support the marking and reading of the IUID mark along with the capture and exchange of data among both internal and external business applications[51].

V. Asset Visibility

Back in 2003 when DoD defined total asset visibility as their key initiative and prescribed IUID as the technology to improve this area, only 4% of the estimated 100 million items had been marked[52]. Without a doubt, IUID has improved asset visibility. Numerous blogs have deemed it essential. One article states IUID is an essential effort for the DoD. It further states the consistent and accurate identification of items will facilitate item tracking throughout each item's life in DoD business systems and the result will be reliable and accurate data for program management and accountability purposes that will also be vital to engineering, acquisition, financial, property, plant, and equipment accountability, maintenance, and logistics processes[53]. Their goal will be to accomplish this while engaging actively with the international standards and commercial item markings communities to ensure they can support IUID marking and data capture requirements. IUID will facilitate integration of item data across DoD, federal, and industry asset management; improve item management and accountability; improve asset visibility and life cycle management; and enable clean audit opinions on item portions of DoD financial statements[54]. The article describes

how IUID is becoming an integral part of DoD business processes. Guidance can be found in DoD Instruction 4151.19, “Serialized Item Management (SIM) for Materiel Maintenance,” signed by Ken Krieg, USD(AT&L) on Dec. 26, 2006. The guidance states that all programs shall facilitate the effective management of populations of select items (parts, components, and end items) throughout their life cycle using data associated to an item by its Unique Item Identifier (UII) and data about the maintenance, logistics, and usage of each specific item will then be collected and analyzed[55]. Let’s not forget about the IUID registry. It is the ultimate repository where all IUID data will be captured. The IUID Registry will serve as an acquisition gateway to: Identify what the item is; identify who receives the item originally; identify the initial value of the item; identify the contract and organization the item is acquired from; intersect with other systems (e.g., property management, logistics, inventory management).

VI. Benefits and Challenges of IUID

As identified throughout the paper, IUID has demonstrated its value throughout DoD and industry. As recently as 2009, an article described what the IUID has contributed to the DoD. No author is identified, but states that the IUID is a strategic essential for the Department of Defense that permanently identifies an individual item of the department for better management and also is an identification that distinguishes an item from all other items that the Department owns or buys[56]. IUID is machine readable, globally unique data element used for marking personal property items and the DoD enterprise reportedly has been benefited in numerous ways with the IUID procedures[57]: (1) Providing IUID is the best commercial practice that is used for asset visibility and traceability methods;

(2) IUID of the items are used for the advanced audit options for the property, plant, operating materials and equipment management. It is also an aid to DoD's financial management statements; (3) IUID provides an extensive approach to strategic purchasing as the data available for the similar personal property items are more accurate with the unique identification; (4) The DoD can achieve an improved and long-term inventory management as the IUID provides better visibility of enterprise assets; (5) The mission-oriented activities can have improved planning and execution through total asset visibility; (6)The DoD has achieved improved item availability and reduced frustration with IUID of the items that has enhanced the efficiency of item management, improved data availability and asset visibility; (7) IUID has lowered the cost of personal property management that has been possible due to consistent use of lifecycle asset information; (8) It also allows total asset visibility for personal property in both peace and wartime[58].

However, some challenges still exist and as recent as 2011 were identified in a professional paper titled, "Automatic Identification Technology: Tracking Weapons and Ammunition for the Norwegian Armed Forces" and written at the post naval graduate school. In his paper, Lien identified four issues[59] (1) Any optical code system requires line of sight from the reader to the code that is read. This means that the process must be adjusted so that this is possible, or that manual labor has to be provided when scanning is done. Adjustment of the current process leads to investment costs, while the use of direct labor increases labor costs and adds time to the process; (2) Codes are vulnerable to damage caused by moisture, injuries or changes in materials. This decreases read accountability, and contingency solutions must be added to register items with

damaged codes. Some application methods make the code hard to replace, and in some cases the marking is irreversible. This can increase errors in production and lead to higher costs. Codes that are hard to read require expensive readers and experience in order to be registered properly; (3) The 2D matrix codes do not provide more than an advanced serial number with a limited storage capacity. This inherent system limitation means that beside increased memory capacity and increased read accuracy it is not possible to develop the technology to serve further purposes; (4) Each code must be read by the reader one code at a time and this increases the time the process takes, and in some cases limits the production or packing processes. Items stored in one pallet must be split up and read individually; this can increase the use of labor and slow down the process[60]. There have been and are numerous groups (steering groups and task force) formed and they are continuing to monitor the program, make recommendations for improvements. I believe the benefits outweigh any of the challenges identified and policy updates will continue to improve the process. All agree that much work is yet to be done, but it is clear that the IUID effort is the essential step in continuing to improve accountability throughout the life cycle of all DoD assets.

VII. Conclusion

IUID has been evolving through the DoD since 2003 and it has improved asset visibility on tangible items immensely. According the IUID Steering Committee, OSD/AT&L, items are being registered at a rate of 40K a week and are expected to exceed 100 million (see figure 5 below)[61]:

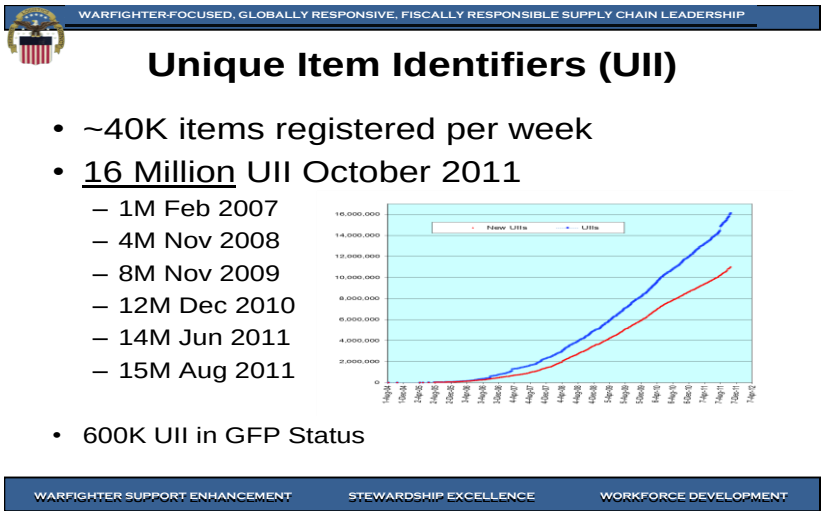


Figure 5: UIIs are expected to exceed 100 million; 4.9 Legacy; 10.8 New Acquisition

600K are Government Furnished Property (GFP). GFP is legacy by definition. The 600K are part of the 4.9M

Peter Collins, President of A2B Tracking Solutions, Inc. noted that compliance has evolved enormously since the concept of tracking serialized assets was first introduced by the Office of the Under Secretary of Defense for Acquisition, Technology and Logistics and millions of dollars have been invested in IUID and it is the program of the future of life cycle management[62]. Back in January 2011, the IUID Scorecard Steering Committee briefed that “Exploiting IUID is the key to Logistics Transformation”, which tells me that this will be an ongoing effort with policy updates and the needs/challenges materialize. In his blog, Mr. Collins noted that we have seen the DoD and its suppliers go from doubt and resistance, to vague interest, to an understanding of the benefits, to willing participants and co-creators of this methodology for realizing unheard of efficiencies in the military and beyond[63].

By integrating commercial best practices for asset management, the Department can capitalize on years of industry asset identification knowledge,

technology, and experience to maximize the potential for savings through efficiency and accountability and believes that IUID provides a positive return on investment and will significantly improve the way we do business in the Department[64]. The IUID Scoreboard Steering Committee provided an updated Timeline below (figure 6) at their last meeting (Nov 2011) which depicts all of the progress that has been made and that DoD are on track to the December 2015 target[65]:

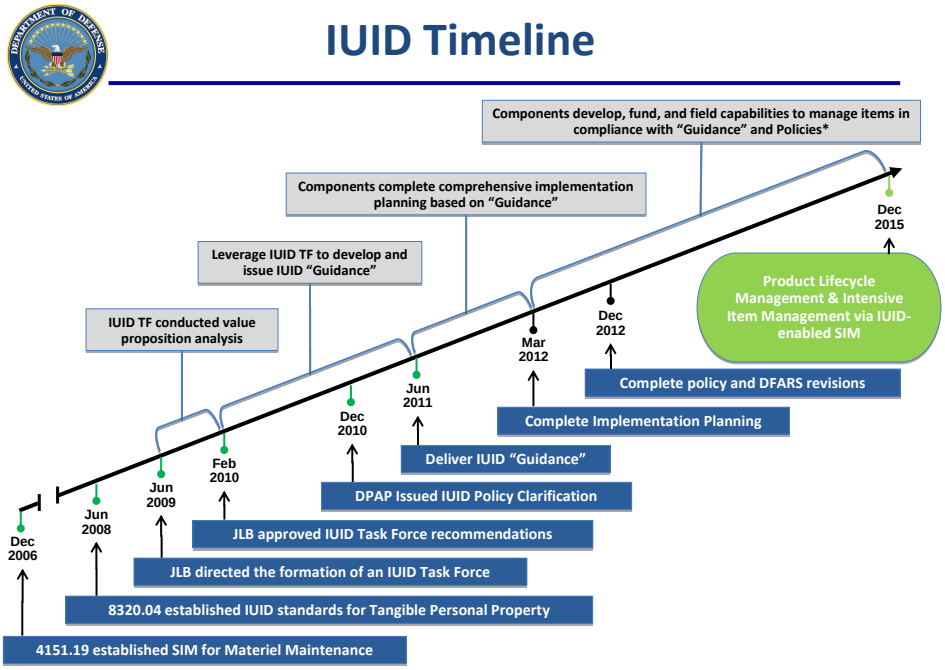


Figure 6: IUID timeline for continued implementation

Finally, we see that 2011 marked a shift in IUID policy ownership. According to the IUID blog, the office that birthed IUID, Undersecretary of Acquisition, Technology and Logistics (AT&L), has passed the baton to the Undersecretary of Logistics, Maintenance, and Readiness (LM&R). This is a profound change that shifts the focus from a contractual obligation and unfunded mandate to the areas

of the armed services that stand to benefit greatly from the technology – the logistics and maintenance enterprise[66]. The already established policies can easily be "refreshed" to take advantage of IUID and the benefits of the technology and during the research, I doubt there will be any major changes at this time due to the shift in departments. Since SIM can be leveraged as a powerful approach to maintaining military equipment and systems, IUID provides that extra layer of machine-readable encoding that will result in more accurate data and lead to productivity improvements[67]. The IUID technology has improved asset visibility and will be around for years to come.

ENDNOTES

[1] Joint Total Asset Visibility Strategic Plan, January 1999, Joint Total Asset Visibility Office, DoD.

[2] Office of Secretary of Defense Material Readiness and Maintenance Policy. "Department of Defense UID Implementation Plan for DoD Depots, May 2005

[3] Ibid

[4] Ibid

[5] Under Secretary of Defense (Acquisition, Technology and Logistics). "Unique Identification of Tangible Items-New Equipment, Major Modifications, and Reprocurements of Equipment and Spares", July 2003

[6] DoD Instruction 5000.64 "Accountability and Management of DoD-Owned Equipment and Other Accountable Property", November 2006

[7] Product Manager Joint Automatic Identification Technology. "Item Unique Identification (IUID)-9 Key Questions", http://www.ait.army.mil/Technology/IUID_datasheet.pdf (accessed October 2011)

[8] Tord H. Lien. "Thesis: Automatic Identification Technology-Tracking Weapons and Ammunition for the Norwegian Armed Forces", June 2011

[9] Ibid

[10] Pablo A. Brown and John E. Laudan. “Item Unique Identification Technology Improving Asset Management”, Army Sustainment Magazine, PB 700-11-02, Volume 43, Issue 2, http://www.almc.army.mil/alog/issues/MarApr11/unique_identication.html (accessed January 18, 2012)

[11] Product Manager Joint Automatic Identification Technology. “Item Unique Identification (IUID)-9 Key Questions”

[12] Ibid

[13] Tord H. Lien. “Thesis: Automatic Identification Technology-Tracking Weapons and Ammunition for the Norwegian Armed Forces”, June 2011

[14] Ibid

[15] Ibid

[16] Ibid

[17] Ibid

[18] ACQuipedia Article. “RFID-Radio Frequency Identification”, https://acc.dau.mil/CommunityBrowser.aspx?id=433995 (accessed January 18, 2012)

[19] Ibid

[20] Ibid

[21] Ibid

[22] ACQuipedia Article. “RFID-Radio Frequency Identification”, https://acc.dau.mil/CommunityBrowser.aspx?id=433995 (accessed January 18, 2012)

[23] Ibid

[24] Ibid

[25] Ibid

[26] A2B Tracking Solutions, “Making a Difference for Asset Visibility, Management and Accountability,

http://www.uidsolutions.com/announcements/making-a-difference-for-asset-visibility-management-and-accountability (accessed December 2011)

[27] Ibid

[28] A2B Tracking Solutions, "Service Progress in Registering Legacy Items", http://www.uidsolutions.com/announcements/making-a-difference-for-asset-visibility-management-and-accountability (accessed December 2011)

[29] Ibid

[30] William R. Hayes, Robert A. Mueller, Thomas Steffen and Mark Sunday. "Implementing Item Unique Identification in DoD", A2B Tracking Solutions, http://www.uidsolutions.com/announcements/implementing-item-unique-identification-in-dod (accessed January 18, 2012)

[31] Ibid

[32] Ibid

[33] Ibid

[34] Peter Collins, "Air Force and Marines Leading IUID Charge" Blog, A2B Tracking Air Force and Marines, http://www.uidsolutions.com/_blog/IUID_Blog/post/Air_Force_and_Marine_Corps_Leading_IUID_Charge/, September 2009 (accessed January 2012)

[35] Diana Woody. "Implementing Item Unique Identification in DoD: Army Success", A2B Tracking Solutions, http://www.uidsolutions.com/announcements/implementing-item-unique-identification-in-dod (accessed January 18, 2012)

[36] Ibid

[37] Ibid

[38] IUID Steering Committee, OSD/AT&L. "IUID Scorecard Updates" November 2011, http://www.acq.osd.mil/dpap/pdi/uid/scorecard_briefing.html (accessed February 2012)

[39] Kathleen Smith. "Status of Intensive Item Management: Implementing IUID in the Supply Chain", OSD/AT&L, January 2011, http://www.acq.osd.mil/dpap/pdi/uid/scorecard_briefing.html (accessed February 2012)

[40] Wolf-Ruediger Hansen and Frank Gilbert. “RFID for the Optimization of Business Process”, 2008

[41] Leah Aspell. “Implementing Item Unique Identification in DoD: Army IUID & Dell Supporting the Office of Secretary of Defense”, A2B Tracking Solutions, http://www.uidsolutions.com/announcements/implementing-item-unique-identification-in-dod (accessed January 18, 2012)

[42] Ibid

[43] Ibid

[44] Ibid

[45] Ibid

[46] A2B Tracking Solutions, “Making a Difference for Asset Visibility, Management and Accountability: Industry Response, http://www.uidsolutions.com/announcements/making-a-difference-for-asset-visibility-management-and-accountability (accessed December 2011)

[47] Ibid

[48] Ibid

[49] Ibid

[50] Ibid

[51] Ibid

[52] Research and Development: “IUID Markings for Legacy Parts”, http://www.imaginestics.com/ResearchAndDevelopment/IUIDMarkingsForLegacyParts (accessed March 2012)

[53] A2B Tracking Solutions, “Making a Difference for Asset Visibility, Management and Accountability: IUID is Essential for the DoD, http://www.uidsolutions.com/announcements/making-a-difference-for-asset-visibility-management-and-accountability (accessed December 2011)

[54] Ibid

[55] Ken Krieg, “DoD Instruction 4151.19: Serialized Item Management (SIM) for Material Management”, USD(AT&L), December 2006

[56] "Functional Aspects of IUID for Department of Defense", http://www.articlesbase.com/business-articles/functional-aspects-of-iuid-for-the-department-of-defense-842628.html, March 2009 (accessed Mar 2012)

[57] Ibid

[58] Ibid

[59] Tord H. Lien. "Thesis: Automatic Identification Technology-Tracking Weapons and Ammunition for the Norwegian Armed Forces", June 2011

[60] Ibid

[61]IUID Steering Committee,OSD/AT&L. "IUID Scorecard Updates" November 2011, http://www.acq.osd.mil/dpap/pdi/uid/scorecard_briefing.html (accessed February 2012)

[62] Peter Collins, "IUID Blog", http://www.uidsolutions.com/_blog/IUID_Blog/post/Property_accountability_%E2%80%93_as_IUID_priority_1, January 2012 (accessed March 2012)

[63] Ibid

[64] Ibid

[65] IUID Steering Committee,OSD/AT&L. "IUID Scorecard Updates" November 2011, http://www.acq.osd.mil/dpap/pdi/uid/scorecard_briefing.html (accessed February 2012)

[66] Peter Collins, "IUID Blog-Property Accountability and IUID priority 1", http://www.uidsolutions.com/_blog/IUID_Blog/post/Property_accountability_%E2%80%93_as_IUID_priority_1, January 2012 (accessed March 2012)

[67] Ibid

BIBLIOGRAPHY

Acquisition/Procurement Guide for Unique Item Traceability Data Integrity, February 2011

Army Regulation (DRAFT), 700-XX, Logistics, Item Unique Identification (IUID)

Department of Defense Directive 8320.03, Unique Identification (UID) Standards for a Net-Centric Department of Defense, March 23, 2007

Department of Defense Directive 8320.04, Item Unique Identification (IUID) Standards for Tangible Personal Property (USD AT&L); June 16, 2008

Department of Defense Directive 8320.04, Item Unique Identification (IUID) Standards for Tangible Personal Property, June 16, 2008, IUID Update Memorandum, December 9, 2008

Department of Defense Guide to IUID Quality Assurance, Version 1.0, November 20, 2009

Department of Defense Guide to Uniquely Identifying Items, Version 2.0, October 1, 2008

Department of Defense Standard Identification Marking of U.S. Military Property, MIL-STD-130N, 17 December 2007

Gilbert, Frank and Hansen, Wolf-Ruediger. "RFID for the Optimization of Business Processes", 2008

"Implementing Item Unique Identification in DoD". Defense AT&L. FindArticles.com. 23 Mar, 2012.

"Item Unique Identification (IUID) of Tangible Personal Property- Policy Refinement for Secondary Items in Use or in Inventory" Memo signed by PDUSD (AT&LL), December 30, 2010

IUID Lessons Learned/Recognized Best Practices, November 27, 2007

Lien, Tord H. "Thesis: Automatic Identification Technology-Tracking Weapons and Ammunition for the Norwegian Armed Forces", June 2011

"Nine Key Questions About IUID", Product Manager-Joint Automatic Identification, Army Center of Excellence for Automatic Reading Technologies, www.ait.army.mil/technology/iuid.html.

Policy Update for Item Unique Identification (IUID) of Tangible Personal Property Memorandum, February 6, 2007

The Basics 101-Item Unique Identification, January 2006